iSphere: A Proximity-based 3D Input Device

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SIGGRAPH 2004

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Introduction

iSphere is a 3D input device that can respond to the proximity of hand positions in order to provide visual feedback on the 3D model. It uses capacitive sensors to detect the position of the user's hand and map the modeling commands, such as pushing on the top surface to open up 3D models in a way that is more intuitive than using traditional 3D modeling commands. The device is designed to be easy to use and provide direct feedback.

Motivation

In most 3D modeling systems, keyboards and mice are used to manipulate 3D objects. However, a user can accidentally make a command-based error, such as accidentally clicking on the wrong part of the model. iSphere is a proximity-based 3D input device that can simplify the process of manipulation by providing visual feedback.

Hardware

The system consists of a series of components that connect to a computer. The computer converts the sensor signals into 3D coordinate representations that can be used to manipulate the 3D model. The sensors are placed on the user's hands and the computer is connected to a 3D modeling software.

Sensors

For long-distance proximity sensing, we use a capacitive sensor that can detect the position of the user's hand. The sensor is placed on a surface and connected to a computer. The user moves their hand close to the sensor and the computer responds by sending the coordinates to the computer. The coordinates are then used to manipulate the 3D model.

Physical Actions

3D designers can use their hands to intuitively manipulate the 3D model. For example, pushing on the bottom surface of a model can be used to scale the model, while pushing on the top surface can be used to rotate the model. The user can manipulate the model directly by moving their hand near the sensor.

Scenario

A user is playing with the iSphere with a 3D model inside a 3D software environment. When the user touches the model, the program automatically switches to inspecting mode and provides visual feedback on the model. The user can then manipulate the model by pushing or pulling on the surfaces, and the program will respond accordingly.

1 kHz square wave
0 kHz square wave

Hands and this device.

generates through the proximity-based interaction between viewpoints. A user is able to view, create, and edit 3D modeling concepts, such as pushing and pulling 3D geometries.